Primary *and*
Key Stage 3
National Strategies

Moving on in my mathematics

Year 6 to 7

Full name: ____________________

Primary school: ____________________

Secondary school: ____________________

Welcome

Welcome to your booklet. You will use this booklet, first of all, for some of your mathematics lessons in Year 6, and later in your new school when you are in Year 7. When you use this booklet in Year 7 mathematics lessons you can show your Year 6 work to your new mathematics teacher to highlight what you achieved in Year 6 and to share your methods of calculation. The booklet is for your own work. There is space for your jottings as well as your answers and solutions. If you need more space to show your working there are some extra blank pages after page 20 and page 50.

When you use this booklet record all your working out and ideas. For each lesson there is a bubble at the top of the page setting out what you are learning and space at the bottom of the page for you to say what you can do by the end of the lesson. As you complete the self-assessment sheets, think about the mathematics you are able to do and what you still want to get better at.

Remember that mathematics is important. Your mathematics will help you in lessons other than mathematics and when you leave school. Inside the booklet are some of the things other children have said about mathematics and some quotes from mathematicians. On page 23 there are spaces for you and your teacher to comment on your mathematics in Year 6.

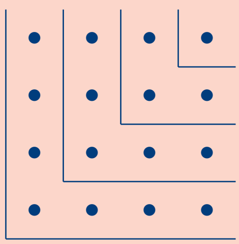
Enjoy the work you do in your mathematics lessons when you use this booklet. It will show you and others the progress you are making and set out some of the mathematics you will continue to use throughout your life.

Pierre-Simon de Laplace (1749–1827) was born in northern France. His parents were poor but he showed his talent for mathematics early on in the village school. He became one of the leading European mathematicians but still felt he had much to learn. He said: 'What we know is not much. What we do not know is immense'.

My mathematics in Year 6

Sophie Germain (1776–1831) grew up in Paris. She taught herself mathematics from her father's books as she was not allowed to study mathematics at the university. She wrote her mathematics under a man's name and when she was forty she won a prize for her work. Finally, she was allowed to work with other mathematicians and use her own name.

Pythagoras (580–500 BC) was born in Greece. He started a school of mathematics in Italy where the students studied numbers. Using patterns of stones to represent numbers, he showed that when you sum consecutive odd numbers you always get a square number.



$1 = 1 = 1^2$

$1 + 3 = 4 = 2^2$

$1 + 3 + 5 = 9 = 3^2$

$1 + 3 + 5 + 7 = 16 = 4^2$

I like:

– mental maths and maths on a computer.

– solving problems because it makes your mind rumble with answers.

– decimals because they are in between whole numbers and they are a challenge.

– drawing symmetrical patterns and doing very hard sums to help me get better at maths.

– problem solving because it's more of a challenge than easy things like multiplication.

– angles in maths because I get to use a protractor and to be precise.

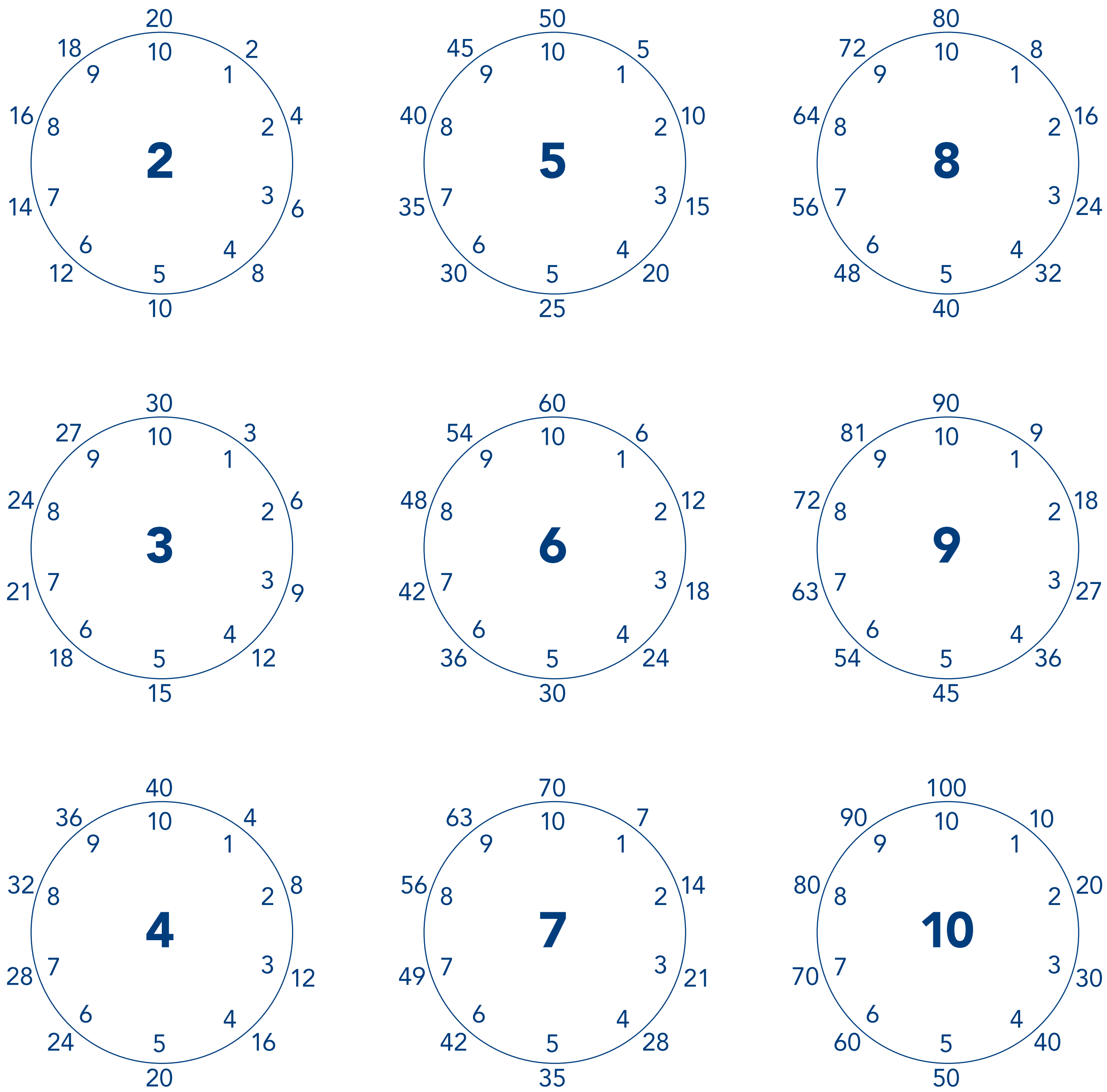
Jemma, Raymond, Linda, Samuel, Charlotte, Larry
Year 6 Class, Sir Francis Drake Primary School

You only have to show that a thing is impossible and some mathematician will go and do it.

Srinivasa Ramanujan (1887–1920) was a self-taught mathematician born in a small town in South India to a poor family. He did well at primary school but once he discovered mathematics he lost interest in everything else. He lived numbers and was invited to England to work with the best mathematicians. Once, in a taxi numbered 1729, someone said 1729 was a dull number. Ramanujan said: 'It's a very interesting number: $1729 = 12^3 + 1^3 = 12 \times 12 \times 12 + 1 \times 1 \times 1$ and $1729 = 10^3 + 9^3 = 10 \times 10 \times 10 + 9 \times 9 \times 9$. It is the smallest number that you can write as the sum of two cubes in two different ways'.

Multiplication and division

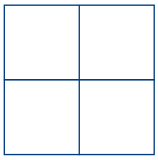
Calculation dials



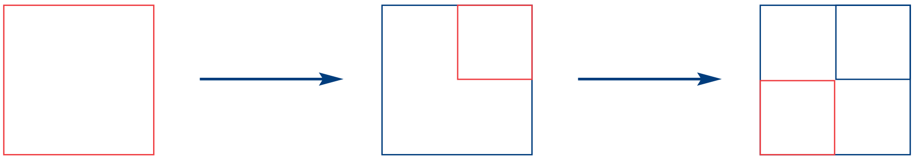
- If 6 × 7 = 42 then: 42 ÷ 7 = 6; 7 × 6 = 42; 42 ÷ 6 = 7.
- If 8 × 4 = 32 then: 80 × 4 = 320; 8 × 40 = 320; 320 ÷ 4 = 80; 320 ÷ 40 = 8.
- If 6 × 9 = 54 then: 0.6 × 9 = 5.4; 6 × 0.9 = 5.4; 5.4 ÷ 0.6 = 9; 5.4 ÷ 9 = 0.6; 5.4 ÷ 6 = 0.9; 5.4 ÷ 0.9 = 6.

Puzzle of the week

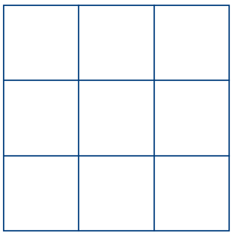
- You can draw this 2 by 2 square



by drawing just 3 squares

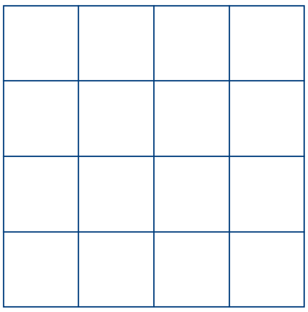


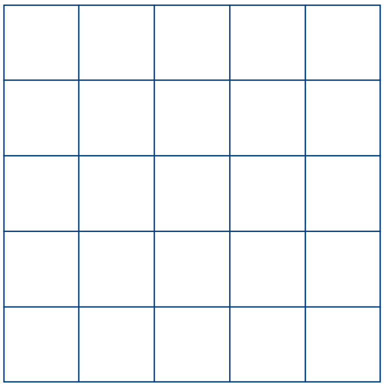
- Can you draw this 3 by 3 square



by drawing just 4 squares?

- What are the fewest squares you need to draw for these squares?



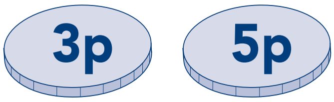


. . . .

- $\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12} = \frac{5}{15} = \frac{6}{18} = \frac{7}{21} = \frac{8}{24} = \frac{9}{27} = \frac{10}{30} = 0.33333\ldots$
- $\frac{1}{4} = \frac{2}{8} = \frac{3}{12} = \frac{4}{16} = \frac{5}{20} = \frac{6}{24} = \frac{7}{28} = \frac{8}{32} = \frac{9}{36} = \frac{10}{40} = 0.25$

- $\frac{1}{5} = \frac{2}{\quad} = \frac{3}{\quad} = \frac{4}{\quad} = \frac{5}{25} = \frac{6}{\quad} = \frac{7}{\quad} = \frac{8}{\quad} = \frac{9}{\quad} = \frac{10}{50} = 0.2$
- $\frac{1}{6} = \frac{2}{\quad} = \frac{3}{\quad} = \frac{4}{\quad} = \frac{5}{30} = \frac{6}{\quad} = \frac{7}{\quad} = \frac{8}{\quad} = \frac{9}{\quad} = \frac{10}{60} = 0.16666\ldots$

Coins

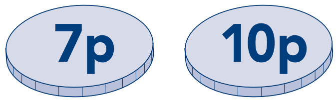


I am learning how to solve money problems and explain my reasons and methods.

- A multiple of 5 is 50
- Multiples of 3 include 3, 6, 9, 12, . . .
- Multiples of 10 include 10, 20, 30, . . .
- Multiples of 0.5 include 0.5, 1, 1.5, 2, 2.5, . . .

I can now

Homework



- Could we buy and pay for anything using just 7p and 10p coins?
  Give examples and explain your decision and reasons.

When doing my homework I learned how to

Making a million

I am learning how to factorise numbers and use a calculator.

A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9
J	10
K	11
L	12
M	13
N	14
O	15
P	16
Q	17
R	18
S	19
T	20
U	21
V	22
W	23
X	24
Y	25
Z	26

Making a million

A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9
J	10
K	11
L	12
M	13
N	14
O	15
P	16
Q	17
R	18
S	19
T	20
U	21
V	22
W	23
X	24
Y	25
Z	26

- When adding two numbers the order of the two numbers does not matter, e.g. $7 + 4 = 4 + 7$.
- When multiplying two numbers the order of the two numbers does not matter, e.g. $7 \times 4 = 4 \times 7$.
- The order does matter for subtraction, $7 - 4 \neq 4 - 7$ and for division $7 \div 4 \neq 4 \div 7$.
- A factor of 36 is 3. All the factors of 36 are: 1, 2, 3, 4, 6, 9, 12, 18, 36.
- Factors of 1 000 000 include: 1, 2, 4, . . .

I can now

Making a million

I am learning how to use multiplication and division with whole numbers to solve problems and to find prime factors.

A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9
J	10
K	11
L	12
M	13
N	14
O	15
P	16
Q	17
R	18
S	19
T	20
U	21
V	22
W	23
X	24
Y	25
Z	26

Making a million

A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9
J	10
K	11
L	12
M	13
N	14
O	15
P	16
Q	17
R	18
S	19
T	20
U	21
V	22
W	23
X	24
Y	25
Z	26

- A prime number has only two factors, 1 and itself.
- The prime numbers are 2, 3, 5, 7, 11, 13, . . .
- 7 is a prime factor of 210, as it is a factor of 210 and 7 is prime.
- 10 is a factor of 210 but not a prime factor of 210, as 10 is not a prime number.
- 6 is the first perfect number, as all its factors, excluding 6, sum to 6 (1 + 2 + 3 = 6).

I can now

Cutting the cake

I am learning how to use multiplication and division with decimal numbers to solve problems and to find area.

Cutting the cake

- 3 divides into 123 exactly, as the sum of the digits of 123 is 6 ($1 + 2 + 3 = 6$) and 6 is a multiple of 3 ($6 \div 3 = 2$).
- 9 divides into 5265 exactly, as $5 + 2 + 6 + 5 = 18$ and 18 is a multiple of 9 ($18 \div 9 = 2$).
- $1376 \div 5$ has a remainder of 1, as 5 divides into 1375 exactly.
- A square with sides 9 cm long has area 81 cm^2 ($9 \times 9 = 81$).
- The dimensions of a square with area 100 cm^2 are 10 cm by 10 cm.

I can now

Collecting for charity

I am learning how to solve mathematical puzzles and word problems and explain my reasons and methods.

- A class of 32 children decide to save for charity for one year.
  The children agree that the minimum amount to be given by each child every month is 35p. Eight children agree to give the minimum amount. Nine children agree they will each give the minimum amount plus an extra 12p. Seven children agree they will each give the minimum amount plus 24p. Five children agree they will each give twice the minimum amount. The rest of the class each gives 75p. The teacher gives £1. How much will the class collect for charity in one year?

- 7832 is divisible by 2, as 7382 is even.
- 7832 is divisible by 4, as 4 × 8 = 32 (4 is a factor of the tens and units number).
- 7832 is divisible by 8, as 8 × 104 = 832 (8 is a factor of the hundreds, tens and units number).
- 1 014 120 is divisible by 4, as 4 × 5 = 20 and divisible by 9, as 1 + 0 + 1 + 4 + 1 + 2 + 0 = 9 so 1 014 120 is divisible by 36, as 4 × 9 = 36 and 4 and 9 share no factors except 1.

Collecting for charity

Group	Number in group	Money to be collected per month					
		35p					£1
A							
B							
C							
D							
E							
F							1 × £1 = £1

Statements

- **Group A** The eight children will give: ______
- **Group B** The nine children will give: ______
- **Group C** The seven children will give: ______
- **Group D** The five children will give: ______
- **Group E** The three children will give: ______
- **Group F** The one teacher will give: ______

Total for the year is: £

I can now

My mathematics Self-assessment sheet 1

Multiply 257 by 2, 3, 5, 8 or 9.

My calculation

Show or discuss with a friend.

I did this calculation:
on my own ☐
with some help ☐

Multiply 456 by 12, 23, 54 or 67.

My calculation

Show or discuss with a friend.

I did this calculation:
on my own ☐
with some help ☐

Multiply 34.8 by 2, 4, 6, 7 or 9.

My calculation

Show or discuss with a friend.

I did this calculation:
on my own ☐
with some help ☐

Divide £31.68 by 2, 4, 6, or 8.

My calculation

Show or discuss with a friend.

I did this calculation:
on my own ☐
with some help ☐

My mathematics
Self-assessment sheet 2

The money problem

- The Government wants to issue only 2p and 6p coins. Luke says, 'You can buy items of any price'. He explains:

10p = 2p + 2p + 6p
So you can buy items costing
10p, 20p, 30p, and so on, for ever.
You can also buy items costing
2p, 4p, 6p and so on, for ever, so you
can pay for any item.

Is Luke right or wrong?

I think Luke is right/wrong because:

Show or discuss with a friend.

I explained my reasons:
on my own ☐
with some help ☐

Summary of what I can do	
I can multiply a 3-digit number by a 1-digit and 2-digit number: on my own ☐ with some help ☐	Multiply 257 by 2, 3, 5, 8, or 9. Multiply 456 by 12, 23, 54, or 67.
I can multiply and divide numbers involving decimals: on my own ☐ with some help ☐	Multiply 34.8 by 2, 4, 6, 7, or 9. Divide £31.68 by 2, 4, 6, or 8.
I can use operations to solve problems, and explain my methods and reasoning: on my own ☐ with some help ☐	The money problem: 2p 6p

My target: I want to get better at

The way I do my calculations

Addition

437 + 49

37.46 + 27.3

Subtraction

440 – 61

432 – 187

The way I do my calculations

Multiplication

234 × 3

42 × 27

Division

159 ÷ 3

476 ÷ 17

Pupil's comments

This information will be helpful for your Year 7 mathematics teacher:

In mathematics I am good at

My favourite topic in mathematics is

I need to improve at

When I am in Year 7 I want to learn more about

Teacher's comments

I achieved a level ☐ in my end of Key Stage 2 mathematics test.

My mathematics in Year 7

Chang Tsang
(230–152 BC)
was a government employee who was also a great soldier. He wrote a mathematics book Chiu-chang suan-shu with nine chapters on the Mathematical Art. It contains nearly 250 problems and is the earliest book with negative numbers explained. Some of the mathematics was 2000 years ahead of its time.

Maria Agnesi
(1718–1799)
was born in Milan. She had twenty younger brothers and sisters. Her father was a silk merchant. She used her knowledge of mathematics to write a book to teach her brothers. The book was translated into many languages. It was praised by other mathematicians for the clear way the ideas and methods were presented.

I like:

– maths that makes you think a lot.

– learning new things in maths, like unusual numbers I didn't know before.

– understanding things that I think are impossible.

– maths that makes my brain work hard and fast.

– using maths I can do, it will help me in the future.

– maths because without it you wouldn't be able to do half the things we do today.

Simone, Femi, Kirun, David, Sharrinna, Nadia
Year 7 Children, London Secondary Schools

Albert Einstein (1879–1955) did not do well at school. He had a poor memory for words and passing language examinations was a struggle. He had a strong interest in science and wanted to know why things happened. When he was five he was fascinated as to why the needle of a compass always pointed in the same direction. He later used mathematics to explain how light could be bent by gravity if we think of light as packets of energy. He claimed to have no special gift, but was passionately curious. He told people not to worry about their difficulties in mathematics, as his were greater!

Problems worthy of attack, prove their worth by fighting back.

Multiplication grid

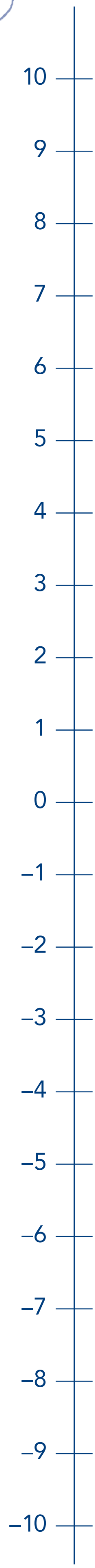
X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1	2	3												
2	2	4	6												
3	3	6	9												
4				16											
5					25										
6						36									
7							49								
8								64							
9									81						
10										100					
11											121				
12												144			
13													169		
14														196	
15															225

- **Challenge:** Fill in all the gaps. The calculation dials on page 3 might help you.

- If 7 × 8 = 56 then:
  14 × 8 = 112; 7 × 16 = 112; 112 ÷ 14 = 8; 1.4 × 8 = 11.2; 11.2 ÷ 1.4 = 8.
- If 9 × 4 = 36 then:
  9 × 8 = 72; 9 × 16 = 144; 18 × 16 = 288; 1.8 × 1.6 = 2.88; 2.88 ÷ 1.8 = 1.6.
- If 8 × 8 = 64 then:
  4 × 8 = 32; 12 × 8 = 64 + 32 = 96; 2 × 8 = 16; 14 × 8 = 96 + 16 = 112; 15 × 8 = 112 + 8 = 120.

Coins and cards

I am learning how to solve problems and explain my methods and reasons.

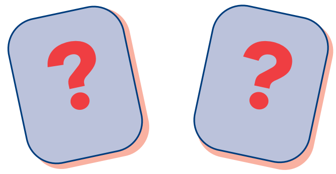


- A positive number is a number greater than zero.
- A negative number is a number less than zero; –6 is read as 'negative six' or 'minus six', –2.3 is read as negative two point three.
- Zero is neither a positive nor a negative number.

I can now

Homework

- I have two double-sided cards and using both cards I can make these values: 7, 10, –1, –4.
  What integers are on each side of the two cards?
- Explain how you worked out your answer.



When doing my homework I learned how to

Positive and negative integers

I am learning how to add and subtract with negative numbers and use them to solve problems.

- An integer is any of the positive or negative whole numbers and zero.
  –75, –3, 0, 17, 2961 are all integers.

More double-sided cards

I can now

Homework

- Fill in the missing numbers so that each row, each column and each diagonal adds up to 3.

–2		
3	1	
2		4

- Make up your own 3 by 3 grid so that each row, each column and each diagonal adds up to –3.

- **Challenge:** Can you always make a 3 by 3 grid so it will add up to any given number. Explain your answer.

When doing my homework I learned how to

Calculations

A 91 + ☐ + 48 = 250	**B** 421.36 + 25.7 = ☐	**C** ☐ + 1457 = 6924
D Find the total of 42 64 78 3 4681	**E** Subtract 2250 from 8500	**F** 7.65 – 6.85 = ☐
G ☐ – 1457 = 2924	**H** What must I add to 5.4 to make 9.3?	**J** 1040.6 – 89.09 = ☐
K 38 × ☐ = 190	**L** Calculate 673 × 24	**M** 9.9 ÷ ☐ = 1.1
N Divide 109.6 by 8	**P** 0.3 × ☐ = 2.4	**Q** 428 ÷ 3.4 = ☐

Calculations

I am learning how to calculate using decimal numbers with up to two decimal places.

- Addition and subtraction are inverse operations:
  $45.62 - 28.8 = 16.82$; $16.82 + 28.8 = 45.62$
- Multiplication and division are inverse operations:
  $204.3 \div 9 = 22.7$; $22.7 \times 9 = 204.3$

I can now

Errors in calculations

A

$$\begin{array}{r} 238 \\ +\,1487 \\ \hline 3867 \\ \hline \end{array}$$

B

$$\begin{array}{r} 720 \\ -\,196 \\ \hline 536 \\ \hline \end{array}$$

C

$$\begin{array}{r} 234 \\ \times\;\;52 \\ \hline 468 \\ 1170 \\ \hline 1638 \\ \hline \end{array}$$

D

$$\begin{array}{r|l} & 176 \\ \cline{2-2} 7 & 123.2 \end{array}$$

$$123.2 \div 7 = 176$$

Homework

- A school needs 220 booklets. The booklets are sold in packs of 16.
  How many packs must the school order?

- **Challenge:** A booklet costs 79p to print. What is the cost of printing a pack of 16 booklets? If postage and package for one pack is an extra £2.85, what is the total cost of 220 booklets? Produce a 'look up' table to help schools work out the cost of ordering any number of booklets up to 160. How could the school use this 'look up' table to find the total cost of 220 booklets?

When doing my homework I learned how to

Problems in the millions!

I am learning how to use a calculator to solve problems involving large numbers.

1. What is the smallest number you can subtract from a million to make the answer exactly divisible by 7893? What is the smallest number you can add to a million to make the answer exactly divisible by 9821?
2. How long in days, hours, minutes and seconds is one million seconds? Are you a million seconds old? How old are you in seconds?
3. Seven sisters were left £1 million by a rich aunt. How much will each of them receive?

Problems in the millions!

4. Sharman is trying to get as close as she can to a million. She can use each of the digits 1 to 9, once and once only, any of the operations +, –, × and ÷, and brackets.

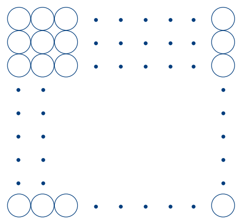
She has tried two examples. She has started recording her answers and how far they are from a million. How close can you get to one million?

Calculation	Answer	How far from a million?
(953 + 721) × 864	1 446 336	+ 446 336
12345 × 678 ÷ 9	929 990	– 70 010

- A million is: $1\,000\,000 = 1000 \times 1000 = 1000^2$
  $1\,000\,000 = 100 \times 100 \times 100 = 100^3$
  $1\,000\,000 = 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 10^6$

Problems in the millions!

- **Challenge:** Two pence coins are used to make a square. If one million coins were used, what would be the length of the sides of the square? How many square metres would these one million coins cover? (The diameter of a 2p coin is 25 mm to the nearest millimetre.)



I can now

Homework

- What number is missing from each of these calculations?

1.	☐	×	34.7	=	933.43
2.	12.7	×	☐	=	323.85
3.	78.72	÷	☐	=	12.3
4.	☐	÷	4.6	=	36.8

Explain how you worked out the answers to these calculations.

- **Challenge:** Make up four calculations like the ones above for someone in your class to answer. You need to know the answers!

When doing my homework I learned how to

Largest calculations

I am learning how to apply my knowledge of numbers to complete calculations and find the biggest and smallest possible answers.

- Using the digits 1, 2, 3, 4 and 5 what is the largest result you can find for each calculation?

$\square\square\square + \square\square$
$\square\square\square - \square\square$
$\square\square\square \times \square\square$
$\square\square\square \div \square\square$

Largest calculations

I can now

Homework

- Play the game 'largest product' with someone at home (see opposite page for rules). Explain the strategies you used to try to win. Can you win every time?

When doing my homework I learned how to

Rules

The aim of the game is to make the larger product. Roll a dice five times. After each roll, both players decide where to place the number in their calculation. The player with the larger product wins.

Game	Player 1	Player 2
1	□ □ □ × □ □	□ □ □ × □ □
2	□ □ □ × □ □	□ □ □ × □ □
3	□ □ □ × □ □	□ □ □ × □ □
4	□ □ □ × □ □	□ □ □ × □ □
5	□ □ □ × □ □	□ □ □ × □ □
6	□ □ □ × □ □	□ □ □ × □ □
7	□ □ □ × □ □	□ □ □ × □ □
8	□ □ □ × □ □	□ □ □ × □ □
9	□ □ □ × □ □	□ □ □ × □ □
10	□ □ □ × □ □	□ □ □ × □ □

My mathematics Self-assessment sheet 1

Multiply 673 by 6, 15, 34 or 87.

My calculation

Show or discuss with a friend.

I did this calculation:
on my own ☐
with some help ☐

Multiply 5.34 by 4, 7 or 9.

My calculation

Show or discuss with a friend.

I did this calculation:
on my own ☐
with some help ☐

Divide 936 by 8, 13, 24 or 39.

My calculation

Show or discuss with a friend.

I did this calculation:
on my own ☐
with some help ☐

Divide 259.56 by 4, 6 or 9.

My calculation

Show or discuss with a friend.

I did this calculation:
on my own ☐
with some help ☐

My mathematics Self-assessment sheet 2

The booklet problem

- A teacher needs 275 booklets. The booklets are sold in packs of 15 and each pack costs £3.75. After finding the total cost of the booklets, Clare explains her method:

I divided £3.75 by 15 in my head and worked out that each booklet costs 25p. I multiplied 25 by 275 to get the total cost as £68.75.

Is Clare right or wrong?

I think Clare is right/wrong because:

Show or discuss with a friend.

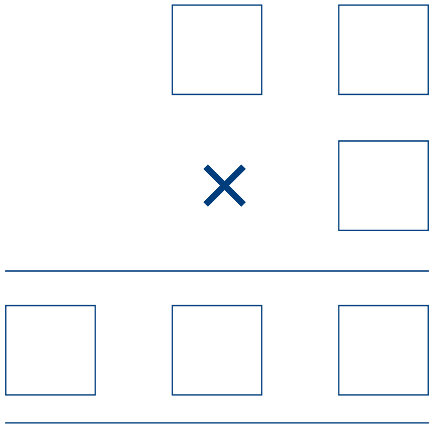
I explained my reasons:
on my own ☐
with some help ☐

Summary of what I can do	
I can multiply and divide a 3-digit number by a 2-digit number: on my own ☐ with some help ☐	Multiply 673 by 6, 15, 34 or 87. Divide 936 by 8, 13, 24 or 39.
I can multiply and divide decimals with one or two places by single-digit whole numbers: on my own ☐ with some help ☐	Multiply 5.34 by 4, 7 or 9. Divide 259.56 by 4, 6, or 9.
I can solve word problems and investigate in the context of number and compare and evaluate solutions: on my own ☐ with some help ☐	The booklet problem.

My target: I want to get better at

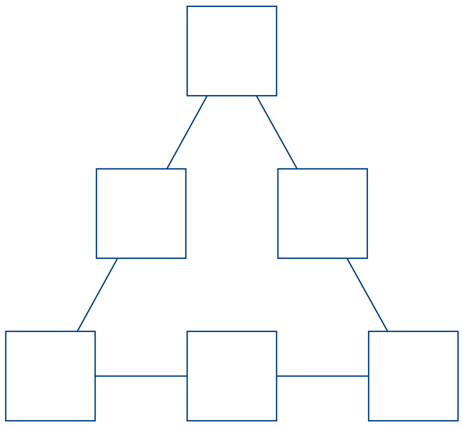
Mathematical puzzles for all

1.



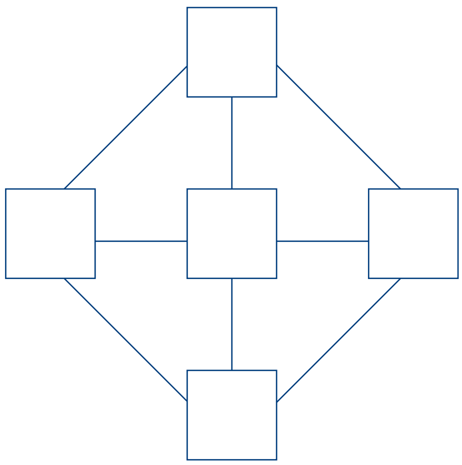
- How can you arrange the six numbers 1, 2, 3, 4, 5 and 6 in the boxes so that this multiplication works?
- Can you use the six numbers 4, 5, 6, 7, 8 and 9?

2.



- How can you arrange the six numbers 1, 2, 3, 4, 5 and 6 in the boxes so that the numbers along each side of the triangle sum to the same total?
- Can you predict the total for the six numbers 4, 5, 6, 7, 8 and 9?

3.



- Can you arrange the five numbers 1, 2, 3, 4 and 5 so that the sum of every three numbers linked by the lines is an even number?
- Can you use the five numbers 4, 5, 6, 7 and 8? Explain your decision.

Mathematical puzzles for all

Mathematical puzzles for all

4. Use your calculator to find:

6×37	9×37	12×37	15×37
18×37	21×37	24×37	27×37

Can you explain why you get this pattern of digits?

Leonhard Euler (1707–1783) was born in Switzerland. His father was a preacher and wanted his son to give up mathematics and enter the church. Euler went on to become a great mathematician, winning many prizes and providing masses of work for others to continue. Prime numbers caused him problems. He said: 'Mathematicians have tried in vain to this day to discover some order in the sequence of prime numbers, and we have reason to believe that it is a mystery into which the human mind will never penetrate'.

Sonya Koralovsky (1850–1891) was born in Russia. She learned mathematics from her uncle and the walls in her bedroom, which were covered in mathematical calculations and formulae. She said: 'Mathematics requires a great amount of imagination'.

'The moving power of mathematical invention is not reasoning but imagination.' Augustus De Morgan (1806–1871)

Karl Friederich Gauss (1777–1855) was born to poor parents in Germany. He had a photographic memory and saw the answers to problems before he had the method for solving them. He said: 'I have had my results for a long time, but I do not yet know how I am to arrive at them'.

'Perfect numbers like perfect men are very rare.' René Descartes (1596–1650)

'There is no problem that cannot be solved.' François Viète (1540–1603)

'Numbers are the free creation of the human mind.' Richard Dedekind

'Number is within all things.' Pythagoras

'Where there is number there is beauty.' Proclus

Isaac Newton (1642-1727) was such a tiny baby that he was not expected to live. He was brought up by his grandmother and attended school in Grantham where he was taught very little mathematics. At twenty he went to Cambridge University but had to leave because of the plague. He spent two years at home when he created most of the great mathematics he went on to develop. He is best known for his 'laws of gravity' which helped other mathematicians to explain and predict events such as tides and the mass of the moon. He said: 'I seem to have been only like a boy playing on the seashore, now and then finding a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me'.

'People who don't count, won't count.' Anatole France

'Number proceeds from unity.' Aristotle

'The control of large numbers is possible, and like unto that of small numbers, if we subdivide them.' Sun Tze